QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

1. *On the Physical Principles by which the Escape of the White Corpuscles of the Blood through the Capillaries is effected.*—The remarkable corroboration that the statements of Waller and Cohnheim respecting the passage of the white corpuscles of the blood through the walls of the capillaries have received by physiologists generally, and the important bearing these observations have upon the question of the formation of pus and the fibrinous exudation of inflammation, confer special interest on all experiments and investigations tending to elucidate the physical principles by which the escape of these corpuscles is effected. At first sight nothing could well be conceived more improbable than that the formed or morphological elements of a fluid contained in a system of elastic tubes should be able to make their way out, whilst the limpid fluid itself should be retained. Not only is it difficult to imagine by what agency the first tendency to pierce the wall is brought about in the corpuscles in the absence of any visible holes in the membrane, but it is still more difficult to explain why the rest of the fluid does not pursue the same path. It is clear that it cannot be exclusively attributed to variations in the pressure of the fluid against the walls of the vessels caused by the action of the heart; for, as this is exerted upon the fluid as a whole, it is inconceivable that it should cause the extrusion of certain particles alone, without the operation of some other force.

An inquiry into the nature of this force has lately been undertaken by Dr. Richard Norris, of Birmingham, who has published two valuable papers upon it: one of which appears in the *Proceedings of the Royal Society*, the other in the *Transactions of the St. Andrews Medical Graduates' Association*. Dr. Norris points out that all the membranes which enter into the animal body may, from a physical point of view, be divided into two orders: the very fine, structureless, homogeneous films, which must be regarded as simple *cohesion membranes*, in contradistinction to the second order of coarse membranes, to which certain mechanical arrangements—as interlacing fibres—are superadded, which have the effect of increasing the strength. Films of collodion, gelatine, India-rubber, and soap may be regarded as examples of the first class of membranes; and these are susceptible of two states—the fixed or rigid condition, and the contractile or elastic state, dependent upon the presence of the principle of "flow," which principle may be operative in every shade and degree, from perfect liquidity to absolute rigidity. Dr. Norris takes the soap film as the best illustration of the class of homogeneous cohesion films possessing in the greatest perfection this principle of "flow," and as best exhibiting phenomena which he has generalized under the term "progressive cohesive attraction." He describes the production of a soap-bubble, and points out the capability it possesses, under the influence of progressive adhesion, of perfecting any absence of continuity that may exist in its structure; so that after its complete detachment it may be perforated by any wetted body, which may again be withdrawn without the bursting of the sphere. Again, he shows that if a soap-bubble be allowed to impinge on a smooth rigid surface, it becomes so drawn down to the plate as to assume a hemispherical form; but if for the rigid surface a delicate plastic film be substituted—such as may be taken up by a ring from a solution of soap—the soap-sphere immediately *penetrates* the film, and arranges itself so that half is on one side and half on the other. If pressure be now applied to one side, the bubble can be caused to protrude still further through the film, and it may even ultimately be made to pass through the film without any rupture occurring in either.

Without entering further into Dr. Norris's ingenious experiments, it is obvious that we have here a very close similarity to the phenomena accompanying the extrusion of the white corpuscles. In both cases the conditions essential for a rigid or a plastic body to pass through a colloid film are present; and these he has shown to be—firstly, an intimate power of cohesion, either mediately or immediately, between the film and the body; secondly, a certain amount of pressure from within; thirdly, power in the substance of the film to cohere to the surface of the body during its passage; and, lastly, cohesive plasticity of the particles of the material of which the film is itself composed, so that the breach in it may again become united as it descends upon the opposite surface of the body which is being extruded. It may be asked, however, why the white corpuscles are not constantly escaping in large numbers from the vessels; to which Dr. Norris replies, that as it is only under certain conditions that the soap-spheres attract each other—namely, when free liquid is cohering to their surfaces—so with the corpuscles, which do not unite with each other or with the capillary wall unless their normal osmotic relations are disturbed, the exosmotic current setting in excessively causing their surface to become coated with previously-contained substance, when they become instantly attractive of the capillary wall.—*Lancet*, Jan. 6, 1872.

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2. *Case of Doubtful Sex.*—Dr. FLUME describes, in the *Nassauisches Aerztl. Corresp. Blt.*, No. 8, 1871, the case of an individual that, from the decided masculine type of the head and of the facial expression, the deep tone of the voice, the full, strong beard, the small, hairy breast, with entire absence of protuberant mammæ, and especially from the appearance of the external genitalia, would be at once taken for a male. A growth of hair extended from the pit of the stomach to the pubes along the median line; from the pubes, a deep sulcus descended, bounded on each side by a firm projection, covered with hair, resembling the labia pudendi of the female. From beneath the anterior commissure formed by these lateral protuberances there projected a penis, one inch in length, resembling in shape and bulk that of a full-grown man; its glans did not present any opening at its lower angle, the orifice of the urethra being at the root of the penis. The individual had never menstruated. Death occurred from an attack of pleurisy. An examination of the body showed the presence of a uterus of the usual size and with a cavity the same as of the normal organ. The tubes and ovaries were also present. The pelvis, in its conformation and expansion was that peculiar to the female. The presence or absence of this formation of pelvis is pointed to by Dr. F. as of the greatest importance in determining the actual sex in all doubtful cases, while the case shows the unreliability of the test referred to by Casper, the presence in the male of the strip of hair along the linea alba.—*Centralblatt f. d. Med. Wissenschaften*, Dec. 9, 1871. D. F. C.

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3. *On the Nutrition of Muscular and Pulmonary Tissues in Health and in Consumption, with Remarks on the Colloid Condition of Matter.*—This is the title of a very interesting paper by Dr. WILLIAM MARCET, published in the